Five-Year Review Report
Rockaway Township Wells Superfund Site
Rockaway Township, Morris County, New Jersey

Prepared by:
U.S. Environmental Protection Agency
Region II
New York, New York

September 2010

Executive Summary

The remedy selected for the Rockaway Township Wells Superfund site (Site) in Rockaway Township, Morris County, New Jersey included extraction and treatment of contaminated groundwater, replacement of the deteriorated air stripping unit on the Rockaway Township Municipal Wells, soil vapor extraction of volatile organic compounds, and monitoring to ensure the effectiveness of the remedies. Construction completion for the Site was achieved with the signing of a Preliminary Close Out Report on September 21, 2005. This five-year review is a policy review. The triggering action for this policy review is the date of the completion of construction of the soil and groundwater remedies for the Site in June 2005. Based upon a review of the 1993 and 2002 Records of Decision, operation and maintenance reports, groundwater and soil vapor monitoring reports, and an inspection of the Site, it has been concluded that the soil remedy at the Site functions as intended by the decision documents and protects human health and the environment. A protectiveness determination of the groundwater remedy cannot be made until additional information is obtained regarding the vapor intrusion exposure pathway.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name *(from WasteLAN)*: Rockaway Township Wells Site		
EPA ID *(from WasteLAN)*: NJD980654214		
Region: 2	**State:** NJ	**City/County:** Rockaway Township, Morris County

SITE STATUS	
NPL status: ■ Final ☐ Deleted ☐ Other (specify)	
Remediation status (choose all that apply): ☐ Under Construction ■ Constructed ☐ Operating	
Multiple Ous? ■ YES ☐ NO	**Construction completion date:** 09/2005
Are portions of this site in use or suitable for reuse? ■ YES ☐ NO ☐ N/A	

REVIEW STATUS	
Lead agency: ☐ EPA ■ State ☐ Tribe ☐ Other Federal Agency	
Author name: Diego Garcia	
Author title: Remedial Project Manager	**Author affiliation:** EPA
Review period:** 6/2005 to 9/2010	
Date(s) of site inspection: 2/24/2010	
Type of review: ☐ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only ☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead ■ Policy ☐ Statutory	
Review number: ■ 1 (first) ☐ 2 (second) ☐ 3 (third) ☐ Other (specify)	
Triggering action: ☐ Actual RA Onsite Construction at OU #___ ☐ Actual RA Start at OU# ___ ■ Construction Completion ☐ Previous Five-Year Review Report ☐ Other (specify)	
Triggering action date *(from CERCLIS)*: 06/8/2005	
Does the report include recommendation(s) and follow-up action(s)? ■ yes ☐ no **Is the remedy protective of the environment?** ■ yes ☐ no	

["OU" refers to operable unit.]

** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form (continued)

Issues, Recommendations, and Follow-Up Actions

This Site has ongoing monitoring and maintenance activities. As anticipated by the decision documents, these activities are subject to routine modification and adjustment. This report includes some recommendations for improving, modifying and/or adjusting those activities.

Other Comments on Operations, Maintenance, Monitoring, and Institutional Controls

Long-term groundwater and soil vapor monitoring is ongoing and will continue. Routine operation and maintenance activities and adjustments to those activities will be made on an ongoing basis as needed. Establishment of a Classification Exception Area by the New Jersey Department of Environmental Protection on November 17, 2000, will assure that there is no unacceptable future use of the contaminated groundwater in the vicinity of the Site.

Protectiveness Statement

Operable Unit 1 (groundwater): A protectiveness determination of the groundwater remedy cannot be made until additional information is obtained regarding the vapor intrusion exposure pathway. Information will be obtained by analyzing indoor air data from Buildings 1 and 2, and completing vapor intrusion studies for buildings overlying the groundwater contamination plume.

Operable Unit 2 (soil): Since the Site is covered with buildings and pavement, it is considered protective of human health and the environment in the short-term. In order for the remedy to be protective in the long-term, the actions identified in Section VIII need to be taken.

Table of Contents

Rockaway Township Wells Superfund Site
Rockaway Township, New Jersey
First Five-Year Review

I. Introduction

This first five-year review for the Rockaway Township Wells Superfund site (see Figure 1), located in Rockaway Township, Morris County, New Jersey, was performed by Diego Garcia, the Remedial Project Manager, in accordance with the Comprehensive Five-Year Review Guidance, OSWER Directive 9355.7-03B-P (June 2001). The purpose of a five-year review is to assure that implemented remedy protects public health and the environment and that it functions as intended by the decision documents. This document will become part of the Site file. The ongoing monitoring program for groundwater and soil vapors indicates that the remedy continues to be protective of public health and the environment.

The triggering action for this policy review is the date of the completion of construction of the soil and groundwater remedies for the Site completed in June 2005. A five-year review is being done because it is EPA's policy to conduct five-year reviews when remedial actions will take longer than five years to reach cleanup levels that provide for unlimited use and unrestricted exposure.

II. Site Chronology

See Table 1 for Site chronology.

III. Background

Physical Characteristics

The Site is located in both Rockaway and Denville Townships in Morris County, New Jersey. Rockaway and Denville Townships are situated in the center of Morris County, approximately 10 miles north of Morristown and 20 miles northwest of Newark in the north/central portion of the state.

The Site lies in the center of a Y-shaped valley in an otherwise hilly area of the New Jersey Highlands on approximately 183 acres located immediately north of Interstate 80 (Figure 1). The area has been developed by commercial businesses and light industries including service stations, restaurants, hotels, plastic manufacturers, truck/transit companies, and commercial office complexes. The Denville Technical Park is located within the Site.

Land and Resource Use

As discussed above, the area has been developed by commercial businesses and light industries including service stations, restaurants, hotels, plastic manufacturers, truck/transit companies, and commercial office complexes. It is unlikely that this development scenario will change in the future.

Ground and Surface Water Uses

The groundwater is drawn from the Rockaway River Basin Area Sole Source Aquifer as a drinking water source for approximately 14,000 residents in Rockaway Township. The groundwater will continue to be the source of drinking water for the foreseeable future. The surface waters of the White Meadow Brook and the Beaver Brook flow into the Rockaway River and are not used for drinking water. Wetlands associated with these brooks exist in the vicinity of the Site.

History of Contamination

Water samples collected by Rockaway Township and New Jersey Department of Environmental Protection (NJDEP) from the Rockaway Township Wells in late 1979 and early 1980 indicated the presence of trichloroethene (TCE) and other volatile organic compounds (VOCs). The Township installed an activated carbon adsorption treatment system in response to this contamination. In October 1980, the treated water developed an unpleasant taste and odor. Analysis showed it to be contaminated with the gasoline additives, di-isopropyl ether and methyl tertiary butyl ether.

Following the discovery of contamination in the wellfield, NJDEP performed an area-wide industrial survey to identify potential sources of the groundwater contamination. The survey, along with additional information, revealed that petroleum hydrocarbon products were present in groundwater at the Shell Gas Station and the Town and Country Gas Station, which are both located on Green Pond Road to the west of the wellfield (see Figure 2). Chlorinated VOCs were present in groundwater at the Denville Technical Park.

In June 1986, pursuant to the New Jersey Spill Compensation and Control Act (Spill Act), N.J.S.A. 58:10-23.11 et. seq., NJDEP issued Directives to Morton Thiokol Incorporated (Thiokol) (then owner of the Denville Technical Park property), Shell Oil Company (Shell), and the Town and Country Gas Station requiring payment to NJDEP to conduct an remedial investigation/feasibility study (RI/FS), and payment to Rockaway Township for the operation and maintenance of the air stripping unit. In May 1987, pursuant to the Spill Act, NJDEP entered into an Administrative Consent Order (ACO) with Thiokol and Shell in which the two companies agreed to

make the above payments. An RI Report was finalized in November 1988. The Town and Country Gas Station never complied with the Directive.

Based on the information from the 1988 RI Report, NJDEP determined that additional studies were necessary and began a Phase II RI. In April 1989, NJDEP issued Directive II to the Town and Country Gas Station requiring payment to NJDEP to conduct the Phase II RI/FS. The Town and Country Gas Station never complied with Directive II. In September 1989, NJDEP issued Directive III to Thiokol, Morton International Incorporated and Shell requiring payment to NJDEP to conduct the Phase II RI/FS, and payment to Rockaway Township for the continued operation and maintenance of the air stripping unit. The Phase II RI Report was finalized in September 1992. The FS Report was finalized in December 1992.

From April 1988 through April 1995, Thiokol and Shell split the operation and maintenance costs of the Township's air stripping unit. In 1995, NJDEP notified Shell that it had satisfied its obligation since gasoline-related contaminants were no longer being detected in the Rockaway Township Wells. Alliant Techsystems (ATK) (a successor to Thiokol) continues to pay the operation and maintenance costs of the Township's air stripping unit.

In 1999, Thiokol was renamed Cordant Technologies, Inc. (Cordant). In 2000, Alcoa Corporation acquired Cordant and assumed responsibility for remedial work at the Site. In April 2001, ATK purchased the Thiokol portion of Cordant's assets from Alcoa, and assumed responsibility for the environmental liabilities at the Site.

Initial Responses

On October 10, 1980, Rockaway Township declared a water emergency and advised residents to avoid consumption of the water until an air stripping unit was installed on the municipal wells for additional treatment of the water prior to distribution to consumers. An air stripping unit was subsequently installed in February 1982. Currently, Rockaway Township uses only the air stripping unit for drinking water treatment. The water treated by the air stripping unit meets New Jersey and federal Safe Drinking Water Act requirements without the need for supplementary treatment. However, to ensure a safe drinking water supply, Rockaway Township uses the carbon adsorption treatment system whenever the air stripping unit is taken out of operation for maintenance or repair.

In 1982, NJDEP requested that EPA consider this Site for inclusion on the National Priorities List (NPL) of Superfund sites because the public water supply was impacted and the source of the

contamination to the wellfield was unknown. EPA placed the Site on the NPL on September 1, 1983.

Basis for Taking Action

A baseline risk assessment was performed as part of the Operable Unit 1 (OU-1) RI to estimate the risks associated with current and future Site conditions. The baseline risk assessment addressed the potential human health and environmental impacts associated with chemicals detected in groundwater and other media at the Site. The baseline risk assessment stated that the domestic use of untreated groundwater was considered unlikely under both current and future land use scenarios because the groundwater is treated at the wellfield prior to distribution to the public. However, human health risks associated with the hypothetical use of untreated groundwater in selected source areas and from the wellfield were evaluated.

The potential for adverse ecological impacts from chemicals detected at the Site also were evaluated using approaches similar to those used in the human health risk assessment.

The baseline human health risk assessment indicated that these risks were above acceptable limits from ingestion of untreated groundwater. The contaminants of concern (COCs) presented in the baseline human health risk assessment for the Site groundwater are TCE, 1,1,1-trichloroethane (TCA), vinyl chloride, methylene chloride, and arsenic. These human health risks are being addressed by the remedial action selected in the Operable Unit 1 (OU-1) ROD. The baseline risk assessment also indicated that adverse impacts to ecological receptors were unlikely.

To specifically estimate the risks associated with contaminated soils at the Denville Technical Park, a focused risk assessment was prepared for the Operable Unit 2 (OU-2) RI. The focused risk assessment estimated that the human health risks presented by soil contamination at the Site, if no remedial actions were taken, and addressed exposures to soil and soil gas at the Site. It also addressed protection of groundwater in response to unacceptable risks identified for hypothetical groundwater use scenarios in the OU-1 RI baseline risk assessment.

The focused risk assessment identified a total of 5 soil and 14 soil gas COCs for the Denville Technical Park. The majority of the COCs are chlorinated VOCs. Four of the COCs were identified for both soil and soil gas. They are TCE, tetrachloroethene (PCE), TCA, and cis-1,2-dichloroethylene (cis-1,2-DCE).

IV. Remedial Actions

Remedy Selection

Based on the June 1993 RI and FS Reports, EPA signed a OU-1 Record of Decision (ROD) on October 5, 1993. The 1993 ROD selected a groundwater remedy for the Site which included:

- Extraction, treatment, and re-injection or utilization of the treated water for potable purposes,
- Monitoring to ensure the effectiveness of the remedy, and
- Replacement of the deteriorated air stripping unit on the Rockaway Township Municipal Wells.

In addition, the 1993 ROD stated that a subsequent decision document was planned to evaluate the need for remediation of soil and contaminant sources. The October 8, 2002 OU-2 ROD addressed contaminated soil adversely impacting the groundwater. A change to the remedy previously selected for OU-1 was also described in that ROD. The major components of the OU-2 remedy included the following:

- Soil vapor extraction (SVE) of VOCs in both the Former Degreaser Pit Area and the Former Underground Storage Tank (UST) Area;
- Treatment, if required, for the extracted vapors prior to release to the atmosphere; and
- Operation of the SVE system for approximately 3 to 5 years to attain the New Jersey Impact to Groundwater Soil Cleanup Criteria.

In addition, the 1993 ROD was modified to allow the treated groundwater to be discharged to the surface water (Beaver Brook) instead of being re-injected or reused as a potable source.

Remedial Action Objectives

As part of the OU-1 and OU-2 RODs, EPA selected Remedial Action Objectives (RAOs) which are specific goals to protect human health and the environment. These objectives are based on available information and standards such as applicable or relevant and appropriate requirements (ARARs) and risk-based levels established in the risk assessments.

The OU-1 RAOs established for the Site groundwater are:

- Prevent potential human exposure to contaminants in the deep aquifer groundwater which pose a carcinogenic risk to human health in excess of 10^{-4} to 10^{-6} and/or which have a Hazard Index greater than 1.

- Prevent potential human exposure to contaminants in the shallow aquifer groundwater which pose a carcinogenic risk to human health in excess of 10^{-4} to 10^{-6} and/or which have a Hazard Index greater than 1.

- Restoration of water quality of the shallow and deep aquifers to appropriate Federal and New Jersey water quality standards.

The OU-2 RAOs established for the Site soils are:

- To provide protection for the Rockaway Township Municipal Wells.

- Remediate the contaminant source areas in the soil at Denville Technical Park to meet the New Jersey Impact to Groundwater Cleanup Standards.

Remedy Implementation

At the request of NJDEP, a combined Groundwater and Soil Remedial Action work plan was prepared by ATK in 2004 which outlined the pre-design activities and design work required to implement the groundwater and soil remedial actions at Denville Technical Park. The work plan was approved by NJDEP on September 8, 2004.

On September 21, 2004, ATK awarded a contract to Conestoga Rovers & Associates (CRA) for the design and construction of the groundwater and SVE remediation systems. The designs were completed in 1999. CRA sub-contracted the construction activities to More-Trench Inc. who began construction of both remedies on September 22, 2004. Construction was completed in June 5, 2005. Operation of the groundwater extraction system began on June 6, 2005 and the operation of the SVE system began on June 7, 2005. Operation and monitoring of both systems is being performed by Leggette, Brashears and Graham, Inc., for ATK.

Groundwater Remedy

The groundwater remedy consists of three groundwater extraction wells and three dual-phase extraction wells constructed to provide containment of impacted site groundwater and prevent further migration of the dissolved VOCs to the municipal wellfield. Extracted groundwater is pumped via an underground forcemain to a 900 square-foot masonry building located at the rear (south) side of the Denville Technical Park. The extracted groundwater is treated in this building using a tray-style air stripper to remove VOCs prior to discharge to an existing storm water drainage pipe that flows to a wetland area adjacent to Beaver Brook. The treated effluent is discharged in accordance with a New Jersey Pollution Discharge Elimination Systems (NJPDES) permit. The air

from the groundwater treatment system (air stripper) are discharged to the atmosphere in accordance with an NJDEP air permit.

Soil Remedy

This remedy was designed to directly address the two soil source areas of the groundwater contamination at Denville Technical Park. Remediation is performed using SVE. In the Former Degreaser Pit Area, a single SVE well was constructed to extract VOC vapors in the area of two former degreasers. In the Former Waste Oil UST Area, 12 SVE wells were installed to extract VOC vapors from the soil. The vapors from the SVE wells are conveyed through an underground forcemain, primarily beneath the paved parking areas, to the same building where the groundwater treatment system is located. The vapors are then sent to a vapor phase treatment system prior to discharge to the atmosphere under an NJDEP air permit. There is a separate room within the treatment building that houses the controls for both systems. Both treatment systems are capable of being remotely monitored and controlled.

Operation, Maintenance and Monitoring

Long-term groundwater and soil vapor monitoring is performed by Leggette, Brashears and Graham, Inc., for ATK to track the performance of the remedial systems, delineate the extent of the plumes, and to evaluate compliance with the remediation goals. The monitoring network consists of 16 monitoring wells which are sampled for VOCs, and 23 monitoring wells measured for groundwater elevations. In addition, three extraction wells are sampled for VOCs and monitored for groundwater elevations.

The effectiveness of the SVE system is monitored by collecting influent air samples from each SVE well and dual-phase well for laboratory analysis for VOCs. Sample collection is currently performed on a semi-annual basis to monitor the effectiveness of the SVE and Groundwater Treatment System.

The groundwater and soil vapor monitoring network is evaluated as operation of the extraction system continues. If data indicates that revisions to the groundwater monitoring network are necessary, a revised groundwater monitoring program will need to be submitted to NJDEP.

Institutional Controls

A Classification Exception Area was established by NJDEP on November 17, 2000, to restrict groundwater use within the aquifer at Denville Technology Park and a portion of the aquifer between Denville Technology Park and the Rockaway Township municipal wellfield.

V. Five-Year Review Process

Administrative Components

The five-year review team consisted of Mr. Diego Garcia, Remedial Project Manager (RPM); Ms. Kristin Giacalone, RPM; Mr. Grant Anderson, Hydrogeologist; and Ms. Chloe Metz, Risk Assessor.

Community Involvement

EPA's Community Involvement Coordinator for the Rockaway Township Wells Superfund Site is Ms. Cecilia Echols. An announcement was published in the Daily Record on June 24, 2010, notifying the community of the initiation of the five-year review. The notice indicated that upon completion of the five-year review, the document would be available to the public at the Rockaway Township Free Public Library located at Rockaway Township, New Jersey. In addition, the notice included the RPM's name, address and telephone number for questions related to the five-year review and the Rockaway Township Wells Site in general.

Document Review

The documents, data, and information which were reviewed in completing this five-year review are summarized in Table 2.

Data Review

This first five-year review focuses on analyzing groundwater and soil vapor data collected since the inception of the monitoring program. Quarterly and semi-annual groundwater and soil vapor sampling has been performed since 2005. This Five-Year Review covers groundwater and soil vapor sampling data from September 2005 through September 2009. The groundwater and soil vapor samples were analyzed for target compound list (TCL) VOCs. Groundwater sampling results taken over the past five years indicate an overall decreasing trend for site-related COCs, with TCE being the primary one, the New Jersey Groundwater Quality Standards (NJGWQS) concentrations of that compound have been consistently above the NJGWQS of 1 micrograms per liter (ug/L). The maximum concentration of TCE detected at the Site in November 2009 was 2,240 ug/L, which is a decrease from the March 1988 maximum concentration of 7,300 ug/L. A summary of the results is provided in Table 3 and discussed below.

There are three plumes of groundwater contamination that emanate from three different areas of the Site - the eastern (Former Degreaser Pit Area), central (Former Waste Oil underground storage tank (UST) Area), and western plumes (See Figures 3 - 6 for the location of the plumes, extraction wells, and monitoring wells).

The plumes are differentiated based on their relative concentrations of TCE and TCA.

Groundwater

Eastern Plume

A plume in the eastern portion of the Site is comprised essentially of TCE and is believed to be associated with the former Building 2 degreasing pit area. Monitoring well MW-14D is located downgradient of the Former Degreaser Area. TCE groundwater concentrations at monitoring well (MW)-14D have decreased over time from 10,600 µg/L in 2001 to less than 50 µg/L since 2005. The most recent (June/December 2009 sampling report) TCE concentration in MW-14D was 10.8 µg/L. The lateral limits of the eastern TCE plume are evaluated by monitoring well samples taken from MW-9D and MW-12D. A TCE concentration of 3.5 µg/L was detected at MW-9D in (December 2009). TCE concentrations at MW-12D have fluctuated between 15 and 110 µg/L since start-up of the groundwater extraction system. The most recent (December 2009) TCE concentration at MW-12D was 29 µg/L.

Central Plume

A central plume appears to originate from the Former Waste Oil UST Area located between Buildings 1 and 2. The central plume contains both TCA and TCE with lesser concentrations of their respective daughter products (cis-1,2-dichloroethene [cis-1,2-DCE], 1,1-dichloroethane [1,1-DCA], and 1,1-dichloroethene [1,1-DCE]). In addition, PCE and carbon tetrachloride, along with its daughter product (chloroform), have been detected within the central plume.

Monitoring wells MW-1, MW-2, and MW-3, identify the central plume source area with the December 2009 VOC concentrations of 104 µg/L, 728 µg/L, and 3,113 µg/L, respectively. At MW-1, VOC concentrations have decreased significantly since start-up of the groundwater treatment system, from a historical high of 110,900 µg/L (2004) to 104 µg/L (December 2009).

The same holds true for source area wells MW-2 and MW-3. At MW-2, the VOC concentrations have decreased from the historical high of over 53,000 µg/L (2005) to 728 µg/L in December 2009. At MW-3, the VOC concentrations have decreased from the historical high of over 40,000 µg/L (2005) to 3,113 µg/L in December 2009.

Monitoring well MW-32D provides a sampling point downgradient of the Former Waste Oil UST Area. The VOC concentration at MW-32D has generally decreased over time, from a historic high of 2,396 µg/L (2001) to 18.7 µg/L in December 2009.

Western Plume

A western plume is defined by samples collected from MW-20D, MW-11S, and MW-29D. VOC concentrations for these wells in December 2009 were 19.3 µg/L, 0.6 µg/L, and 190 µg/L, respectively. VOC concentrations at MW-11S indicate a decreasing trend, from a high of over 700 µg/L in 2000 to levels in the 4 µg/L range since August 2005. The VOC concentrations at MW-29D initially increased to a maximum level approaching 5,000 µg/L after system start-up in June 2005. Since that time, VOC concentrations have fluctuated, but all at levels below that 2005 maximum value.

Former Petroleum UST Areas

Monitoring well MW-4 is located in the former petroleum UST area behind Building 2. The only VOC detected in MW-4 was chloroform at a concentration of 1.9 µg/L in December 2009. Historically, TCA and TCE concentrations at MW-4 have decreased over time, to the most recent non-detectable (ND) levels.

Off-Site Monitoring Wells

Two monitoring wells (MW-5DB and MW-6D) were sampled in December 2009 to provide data characterizing the VOC plume as it migrates towards the Rockaway Township Wellfield. MW-5DB is a deep regional aquifer well that is located west of the Rockaway Township Wellfield. This area has been impacted by petroleum-related compounds from the Shell Service Station at 8 Greenpond Road. In December 2009, no detectable levels of petroleum-related VOCs were reported in the MW-5DB sample. Monitoring well MW-5DB contained TCE at a concentration of 2.1 µg/L, which is consistent with historical TCE concentrations measured at that well. The other VOC detected at MW-5DB was 1,1-DCA at a concentration of 3.9 µg/L. MW-6D is located north of the Site and between the Site and the Rockaway Township Wellfield. The December 2009 VOC concentration at MW-6D was 29.5 µg/L, primarily comprised of TCE (27.1 µg/L). VOC concentrations in MW-6D have generally exhibited a decrease since 2007, and remain below the historical high of 496 µg/L (2000).

Soil-Vapor Extraction System

During December 2009, the SVE system operated approximately 94 percent of the time, with brief weather-related power outages and SVE equipment-related shutdowns. An air sample is collected for VOC analysis from the carbon effluent on a monthly basis, in accordance with the SVE air permit. SVE effluent air analytical results indicate that air emissions are below the permit requirements. VOC analytical data indicated air permit requirements for operation of the vapor phase carbon treatment system were met during December 2009. Individual soil-vapor

samples were collected on December 16, 2009, from each SVE and dual-phase well and submitted to Microseeps Laboratory in Pittsburgh, Pennsylvania for analysis specific to a select list of chlorinated organic compounds, including TCE and TCA.

Results of the laboratory vapor analysis indicated detectable VOC concentrations in eight of the eleven sample locations. The maximum VOC vapor concentration measured was 1.548 parts per million by volume, taken from SVE-2.

An estimate of the mass of VOCs removed from the soil through the SVE system during December 2009 has been made using SVE flow data and the VOC analytical results from influent samples collected on September 11 and December 11, 2009. The influent samples were collected from the combined SVE line just prior to entering the SVE carbon unit. Based upon these assumptions, approximately 88 pounds (lbs) of VOCs were extracted from the soil during December 2009. Since the initial SVE system start-up in June 2005, approximately 1,138 lbs of VOCs have been removed from the soil.

Groundwater Extraction and Treatment System

The Groundwater Treatment System consists of three groundwater extraction wells and three dual-phase (soil vapor and groundwater) extraction wells. The extraction wells are all located in the suspected source area to provide effective VOC mass removal from the most contaminated portions of the aquifer. The following provides a general description of the operation and effectiveness of the groundwater extraction wells.

Extraction Well EW-1

Extraction well (EW)-1 is located on the north side of Building 2, downgradient of the Former Degreaser Area. The former degreaser pit was located inside Building 2, near vapor well (VW)-3. EW-1 was designed specifically to provide source-area capture and treatment of groundwater impacted from the Former Degreaser Pit Area. TCE and PCE are the primary COCs at EW-1. Both compounds remain above the remediation goal of 1 µg/L. Current concentrations of TCE and PCE are 272 µg/L and 6.1 µg/L, respectively. Since system start-up, EW-1 has removed 78 lbs of VOCs and 11.4 million gallons of groundwater (6.8 lbs of VOCs per million gallons of water) at the Site.

Extraction Well EW-2

Extraction well EW-2 is located between Buildings 1 and 2, in the vicinity of the Former Waste Oil UST Area. EW-2 was designed specifically to provide source-area capture and treatment of groundwater impacted from the Former Waste Oil UST Area. Based on groundwater quality data, the highest VOC concentrations in the

Former Waste Oil UST Area, with respect to the regional aquifer, are measured at EW-2, indicating the most contaminated portion of the plume is being captured in this area.

TCE is the primary compound of concern at EW-2. The TCE concentration at EW-2 is 278 µg/L (December 2009). Since system start-up, EW-2 has removed 74 lbs of VOCs and 31.8 million gallons of groundwater (2.3 lbs of VOCs per million gallons of water).

Extraction Well EW-3

Extraction well EW-3 is located north of Building 1, downgradient of the potential source area beneath Building 1. A source beneath Building 1 has not been identified; however, based on groundwater concentrations and groundwater flow direction, it is inferred that a contaminant source may be present at this location. EW-3 was designed specifically to provide source-area capture and treatment of groundwater impacted from historical Building 1 operations. Based on groundwater quality data, the highest VOC concentration in the Building 1 area is measured at MW-29D. TCE and 1,1-DCE are the primary COCs at EW-3. Both compounds remain above the remediation goal of 1 µg/L. Current concentrations (December 2009) of TCE and 1,1-DCE are 96.6 µg/L and 13.8 µg/L, respectively. Since system start-up, EW-3 has removed 164 lbs of VOCs and 100.8 million gallons of groundwater (1.6 lbs of VOCs per million gallons of water).

Dual-Phase Wells

The three dual-phase wells, DP-1, DP-2 and DP-3 are located between Buildings 1 and 2, in the vicinity of the Former Waste Oil UST Area. The intent of the dual-phase wells is to extract a low volume of highly contaminated perched groundwater water in the suspected source area and to suppress the water table in the area around the SVE wells. The dual-phase wells cycle continuously and extraction rates fluctuate based on seasonal fluctuations of the water table. Since system start-up, the dual-phase wells have generally operated between 1 to 2 gallons per minute. The dual-phase wells have removed 17.6 lbs of VOCs and 268,206 gallons of groundwater since system startup.

Vapor Intrusion

As a result of elevated concentrations of VOCs in the groundwater at the Site, in April 2009, soil gas sampling was performed in Buildings 1 and 2. The sampling results showed exceedances of NJDEP's non-residential soil gas screening levels for four VOCs (carbon tetrachloride, chloroform, methylene chloride, and TCE) in Building 1. TCE is the only compound in Building 1 that appears to have a complete soil gas pathway to indoor air based on a

review of subslab soil vapor sampling results and tenant chemical usage (Indoor Air Sampling Report April 2010).

Exceedances in soil gas above NJDEP's non-residential soil gas screening levels for seven VOCs (acetone, benzene, chloroform, PCE, TCE, toluene, and xylenes) were identified in Building 2. Four of the seven VOCs detected (acetone, benzene, toluene, and xylenes) are not Site-related VOCs. Based on a review of sub-slab soil vapor concentrations and tenant chemical usage (Indoor Air Sampling Report April 2010), only TCE and PCE appear to have a complete soil gas pathway to indoor air at Building 2.

As a result of the soil gas investigation, indoor air sampling was performed in February and March 2010 to evaluate whether Site-related VOCs were being emitted from soil and/or groundwater to an extent that could potentially impact the indoor air quality in Buildings 1 and 2 which overlie the highest VOC plume concentrations. The results indicated exceedances of NJDEP's non-residential indoor air screening levels for select VOCs (TCE and PCE).

Based on the results of the indoor air investigation, air handling systems in Building 1 and 2 were adjusted to bring in more outside air. In addition, on July 8, 2010, a sub-slab depressurization system was installed in Building 2. Confirmation sampling in fall 2010 will be used to determine whether the mitigation system is effectively interrupting the vapor intrusion pathway.

Site Inspection

A Site inspection was performed on February 24, 2010. The following parties were in attendance:

Diego Garcia, EPA Region II Project Manager
Kristin Giacalone, EPA Region II Project Manager
Chloe Metz, EPA Region II Risk Assessor
Grant Anderson, EPA Region II Hydrogeologist
Donna Gaffigan, NJDEP Site Manager
Kathleen Kunze, NJDEP Risk Assessor
Paul Barnish, WP Realty
John Barnish, WP Realty
Robert Sheard, Rockaway Township Water Department

The attendees toured the groundwater and SVE treatment system facility, monitoring and extraction well locations, and Buildings 1 and 2 in the Denville Technical Park. Conditions observed at the treatment facility and well locations indicated that they are being well maintained and properly operated. In addition, Chloe Metz and Kathleen Kunze were given a tour of Buildings 1 and 2 by representatives of WP Reality for their assessment of the vapor intrusion investigation at the Site.

Interviews/Meetings

Interviews were performed with the participants of the Site inspection on February 24, 2010. The following items were discussed during the interviews: operation of the groundwater and SVE treatment system; groundwater monitoring wells and SVE analytical data; the nature and extent of the groundwater plumes; and the vapor intrusion investigation (Recommendations and Follow-up Actions are discussed in Section VIII and Table 4).

VI. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

Most elements of the remedy are functioning as intended; however, some portions of the remedy are not fully functioning as intended.

TCE contamination of groundwater is found in two distinct plumes. The first plume ("western plume") has no identified source and is the less-contaminated of the two. Groundwater extraction well (EW-3) was designed to intercept the western plume. The remedy addressing the western plume is functioning as intended. Extraction well EW-3 is creating a significant cone of depression in the water table which acts as a hydraulic boundary to the contamination. Additionally, all the monitoring wells located in the western plume (i.e., MW-11S, MW-29D, and MW-32D) have all shown declining TCE concentration trends since 2005.

The second plume ("eastern plume") appears to have multiple sources of contamination. A source of TCE contamination is located in the vicinity of groundwater extraction well EW-2, and is being addressed by the SVE system. Another known source of contamination is located inside Building 2, at the location of a former degreaser pit and is being addressed by the SVE system through vapor well EV-1 and downgradient groundwater extraction well EW-1.

Overall, the SVE system appears to be functioning as designed. In fact, the monitoring wells located near the SVE system (i.e., MW-1, MW-2, MW-3, and MW-21D) have all shown declining concentration trends since 2005.

For several reasons, EPA believes that the groundwater extraction well for the eastern plume, EW-1, is not fully functioning as intended. First, EW-1 extracts very little groundwater. Since its startup in 2005, EW-1 has extracted less than 10 percent of the volume of groundwater extracted by EW-3. Second, EW-1 causes little measurable drawdown of the water table, even in contaminated monitoring well MW-14D, located only about 10 feet

away and completed at the same depth as the extraction well. Third, groundwater contaminant concentrations in monitoring wells in the area are either not decreasing, or have actually increased in concentration since 2005. This includes MW-9D, MW-12D (increasing trend), and MW-14D.

Therefore, it appears that the eastern plume is not being fully captured, and contamination continues to move unimpeded toward the Township's wellfield. Downgradient well MW-6D has shown declining trends since 2005, but that location is affected by the dual-phase extraction wells and EW-3, which are functioning as intended.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?

The exposure assumptions and the toxicity values that were used to estimate potential risks and hazards to human health followed the general risk assessment practice at the time the risk assessment was performed. Although the risk assessment process has been updated, and certain parameters and toxicity values may have changed, the risk assessment process that was used is still consistent with current practice and the need to implement a remedial action remains valid. However, new information on vapor intrusion has shown that this exposure pathway was not adequately characterized by previous assessments. This is discussed in the answer to Question C, below.

The groundwater cleanup goals established in the 1993 OU-1 ROD were the more stringent of the federal and state drinking water standards, and the NJGWQS. Although groundwater contaminant concentration data collected during the past five years indicates an overall decreasing trend for site-related COCs, with TCE being the primary one, the concentrations of that compound have been consistently above the NJGWQS of 1 ug/L. The maximum concentration of TCE detected at the Site in November 2009 was 2,240 ug/L. It is anticipated that with continued operation of the remedial systems, and efforts to improve the performance of EW-1, the cleanup goals will be achieved.

Additionally, the municipal supply well that was impacted by site-related COCs is treated with an air stripper to meet drinking water quality standards. Because no one is exposed to contaminated groundwater, the exceedances of drinking water standards do not affect the protectiveness of the remedy.

As noted in the 1999 RI/FS report, a sand filter bed that received chromate acid plating wastewater was located south of Building 2. Only limited groundwater sampling was performed in the area for chromium during the RI, and currently, only VOC data have been collected. Additional groundwater samples from this area would

need to be obtained and analyzed for hexavalent chromium to ensure that the compound, which is highly soluble and can not be treated by air stripping, is not present in the groundwater.

Further, 1,4-dioxane is another a highly soluble compound that is not able to be treated by air stripping. It is often used as a stabilizer for TCA, which is present in groundwater at the Rockaway Township Site. Sampling for 1,4-dioxane has not been performed. Therefore, it is suggested that groundwater samples be collected from the Site, as well as the public supply well, and analyzed for 1,4-dioxane to ensure the compound is not present in the groundwater or drinking water.

The Focused Risk Assessment performed as part of the 1999 RI/FS for OU-2 determined that exposure to subsurface soil would not result in an unacceptable risk or hazard to a commercial worker, construction worker, or trespasser. That risk assessment was based on the Site being in commercial/industrial use, and almost entirely covered by buildings or pavement. However, soil from the ground surface to a depth of two feet was not sampled and, as a result, potential risks or hazards associated with that two-foot soil interval were not assessed. Therefore, an institutional control (e.g., a deed notice) should be placed on the Site to indicate the potential presence of contaminants and the need for precautionary measures should intrusive activities need to be performed. Additionally, the institutional control should indicate that sampling of surface soil (0 to 2 feet) should be performed if land usage were to change in the future (e.g., residential use). Since the OU-1 and OU-2 RODs did not include institutional controls for the Site, an Explanation of Significant Differences (ESD) will need to be prepared.

Questions C: Has any other information come to light that could call into question the protectiveness of the remedy?

The Focused Risk Assessment in the 1999 RI/FS concluded using modeling that there was no risk from inhalation of vapors to the tenants of Building 2. However, a recent vapor intrusion investigation revealed that residual VOC contamination in the groundwater and soil is impacting Buildings 1 and 2. Region 2's multiple-lines-of-evidence approach for evaluating vapor intrusion was used in conjunction with the State of New Jersey's Vapor Intrusion Guidance to evaluate subslab and indoor air data collected from the Denville Technical Park.

Conversely, a risk assessment focused on soil above a 2-foot depth could be performed but would require the collection of soil samples from that layer.

In Building 1, the maximum subslab concentration of TCE was 3,210 micrograms per cubic meter (ug/^{m3}) (April 2009) and the maximum indoor air concentration was 8.6 ug/^{m3} (March 2010). The air handling system in Building 1 has been adjusted to bring in more outside air. A sub-slab depressurization system is planned for installation in the fall. Confirmation sampling will be performed after the installation of the system, to evaluate the effectiveness of this measure at lowering indoor concentrations.

In Building 2, the maximum subslab concentration of TCE was 75,200 ug/^{m3} (April 2009) in the area of the former degreaser pit and the maximum concentration of PCE was 107 ug/^{m3} (April 2009). Sampling results confirm that the indoor air in Building 2 is impacted by subslab contamination, as indicated by a maximum concentration of 1,160 ug/^{m3} of TCE (February 2010) and 31 ug/^{m3} of PCE (February 2010). In the short-term, the air handling system in Building 2 has been adjusted to bring in more outside air. A sub-slab depressurization system was installed on July 8, 2010. Confirmation sampling in the fall of 2010 will be used to determine whether the mitigation system is effectively interrupting the vapor intrusion pathway.

Based on subslab soil gas results, it appears that sources of groundwater contamination may be present in Buildings 1 and 2 that are not being captured by the SVE system. EPA recommends that a source investigation be performed in both buildings.

VII. Remedy Assessment Summary

Based on the data reviewed and the Site inspection, most elements of the remedy are functioning as intended; however, it is anticipated that with continued operation of the remedial systems, and efforts to improve the performance of EW-1, the cleanup goals will be achieved in the long-term.

VIII. Recommendations and Follow-Up Actions

Several follow-up actions were identified as part of this five-year review.

Groundwater samples should be collected for hexavalent chromium and 1,4-dioxane from the Site, as well as the public supply well, to ensure the compound is not present in the groundwater or drinking water.

A well cluster should be installed with one well being within 10 feet below the water table and a second at about a 50-foot depth in a location between EW-1 and 701 Ford Road (See Figure 7). This well cluster would be important for evaluating the downgradient performance of the groundwater extraction system.

Confirmation sampling should be performed after the installation of the sub-slab depressurization system in Building 1 to evaluate the effectiveness of the measure at reducing concentrations of VOCs in indoor air concentrations.

EPA recommends that a source investigation be performed in Buildings 1 and 2 at Denville Technical Park. Additionally, EPA recommends that the vapor intrusion investigation be expanded to Buildings 3, 5, and 6, and 701 Ford Road to determine if a vapor intrusion pathway is potentially completed there.

An institutional control (e.g., a deed notice) should be placed on the Site to indicate the potential presence of contaminants and the need for precautionary measures should intrusive activities need to be performed Table 4 shows all recommendations and follow-up actions.

IX. Statement of Protection

Operable Unit 1 (groundwater): A protectiveness determination of the groundwater remedy cannot be made until additional information is obtained regarding the vapor intrusion exposure pathway. Information will be obtained by analyzing indoor air data from Buildings 1 and 2, and completing vapor intrusion studies for buildings overlying the groundwater contamination plume.

Operable Unit 2 (soil): Since the Site is covered with buildings and pavement, it is considered protective of human health and the environment in the short-term. In order for the remedy to be protective in the long-term, the actions identified in Section VIII need to be taken.

X. Next Review

EPA will conduct the next five-year review by September 2015.

Approved:

Walter E. Mugdan, Director
Emergency and Remedial Response Division
EPA - Region II

9/30/2010
Date

Table 1

TABLE 1 - Chronology of Site Events	
Event	**Date(s)**
Water samples collected from the Rockaway Township Wells by the Rockaway Township Health Department and NJDEP indicated the presence of TCE and other VOCs.	1979 to 1980
The Township installed an activated carbon adsorption treatment system in response to this contamination.	1980
NJDEP requested that the EPA consider the Site for inclusion on the National Priorities List (NPL) of Superfund Sites.	1980
EPA placed the Site on the NPL.	1982
NJDEP issued Directives to Morton Thiokol Incorporated (then owner of the Denville Technical Park property), Shell Oil Company, and the Town and Country Gas Station requiring payment to NJDEP to conduct a remedial investigation/feasibility study (RI/FS), and payment to Rockaway Township for the operation and maintenance of the air stripping unit.	September 1, 1983
NJDEP entered into an Administrative Consent Order (ACO) with Morton Thiokol Incorporated and Shell Oil Company in which the two companies agreed to make the above payments.	1986
Groundwater RI/FS study completed.	1987
Phase II RI Report began.	December 1992
Phase II RI finalized.	September 1989
FS Report finalized.	September 1992
Groundwater Record of Decision (ROD) signed.	December 1992
Air stripper replaced by Potentially Responsible Parties.	October 5, 1993
Source RI/FS completed.	May 1995
Source ROD signed.	August 1999
Soil and groundwater remedial design completed.	September 8, 2004
Construction of both remedies completed.	June 2005

Preliminary Close Out Report completed.	September 2005
Remedial Action Report completed.	September 2005
Quarterly sampling begins.	September 2005
Semi-annual sampling begins.	January 2008
Vapor intrusion investigation begins.	August 2008
First five-year review completed.	September 2010

Table 2

List of Documents Reviewed

- Record of Decision - (OU1 - Groundwater) - EPA, issued on October 5, 1993.
- Record of Decision - (OU2 - Soils) - NJDEP, issued on October 8, 2002.
- Administrative Consent Order - NJDEP, issued on March 13, 1996.
- Groundwater and Soil Remedial Action Work Plan - NJDEP, issued on September 8, 2004.
- Superfund Preliminary Close Out Report, EPA, issued on September 21, 2005.
- Remedial Action Progress Reports, PRP, 2005-2009.

TABLE 3

GROUNDWATER ANALYTICAL DATA
DETECTED VOCS
DENVILLE TECHNICAL PARK
DENVILLE, NEW JERSEY

Location	*Dup*	*Date*	*1,1,1-Trichloroethane* µg/L	*1,1,2-Trichloroethane* µg/L	*1,1-Dichloroethane* µg/L	*1,1-Dichloroethene* µg/L	*Benzene* µg/L	*Carbon Tetrachloride* µg/L	*Chloroform (Trichloromethane)* µg/L	*cis-1,2-Dichloroethene* µg/L	*Tetrachloroethene (PCE)* µg/L	*trans-1,2-Dichloroethene* µg/L	*Trichloroethene (TCE)* µg/L	*Total VOCs* µg/L
EW-1		11/18/09	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	6.10	< 1.00	272.00	278.10
EW-2		11/18/09	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	6.30	< 1.00	278.00	284.30
EW-3		11/18/09	11.70	< 1.00	1.10	3.80	< 1.00	0.48 J	1.20	7.20	0.45 J	< 1.00	67.90	93.83
MW-1		11/18/09	93.70	1.90	0.99 J	3.00	< 1.00	< 1.00	< 1.00	0.45 J	0.67 J	< 1.00	3.50	104.21
MW-2		11/19/09	< 2.50	2.30 J	3.30	< 2.50	< 2.50	< 2.50	0.91 J	283.00	3.90	0.69 J	434.00	728.10
MW-3		11/19/09	89.00	3.80 J	55.80	44.00	< 5.00	59.00	137.00	464.00	16.90	3.30 J	2,240	3,112.80
MW-4		11/17/09	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	1.90	< 1.00	< 1.00	< 1.00	< 1.00	1.90
MW-5DB		11/18/09	< 1.00	< 1.00	3.90	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	2.10	6.00
MW-6D		11/18/09	< 1.00	< 1.00	1.40	0.62 J	0.39 J	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	27.10	29.51
MW-9D		11/17/09	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	5.30	< 1.00	3.50	8.80
MW-11S		11/17/09	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0.57 J	0.57
MW-12D		11/19/09	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	2.40	< 1.00	29.00	31.40
MW-12D (Rep 2)	D	11/19/09	0.86 J	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	2.50	< 1.00	29.70	33.06
MW-14D		11/17/09	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	6.90	< 1.00	10.80	17.70
MW-20D		11/18/09	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0.91 J	0.97 J	< 1.00	17.40	19.28
MW-20D (Rep 1)	D	11/18/09	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0.95 J	1.10 J	< 1.00	19.60	21.65
MW-21D		11/18/09	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0.56 J	< 1.00	< 1.00	< 1.00	1.50	2.06
MW-28D		11/17/09	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0.62 J	0.62
MW-29D		11/19/09	56.80	< 1.00	3.00	13.80	< 1.00	1.70	3.80	12.90	1.10	< 1.00	96.60	189.70
MW-30D		11/17/09	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0.55 J	0.55
MW-32D		11/19/09	3.90	< 1.00	3.10	1.90	< 1.00	< 1.00	0.63 J	0.87 J	< 1.00	< 1.00	8.30	18.70

New Jersey Groundwater Quality Standard					
1,1,1-Trichloroethane	30 µg/L	Benzene	1 µg/L	Tetrachloroethene (PCE)	1 µg/L
1,1,2-Trichloroethane	3 µg/L	Carbon Tetrachloride	1 µg/L	trans-1,2-Dichloroethene	100 µg/L
1,1-Dichloroethane	50 µg/L	Chloroform	70 µg/L	Trichloroethene	1 µg/L
1,1-Dichloroethene	1 µg/L	cis-1,2-Dichloroethene	70 µg/L	Vinyl Chloride	1 µg/L

Notes:

Concentration exceeds the respective New Jersey GW Quality Standard.

< Analyte not detected above the reporting limit.

D Duplicate sample.

FB Field Blank

µg/L Micrograms per liter, or parts per billion (ppb).

J Estimated concentration.

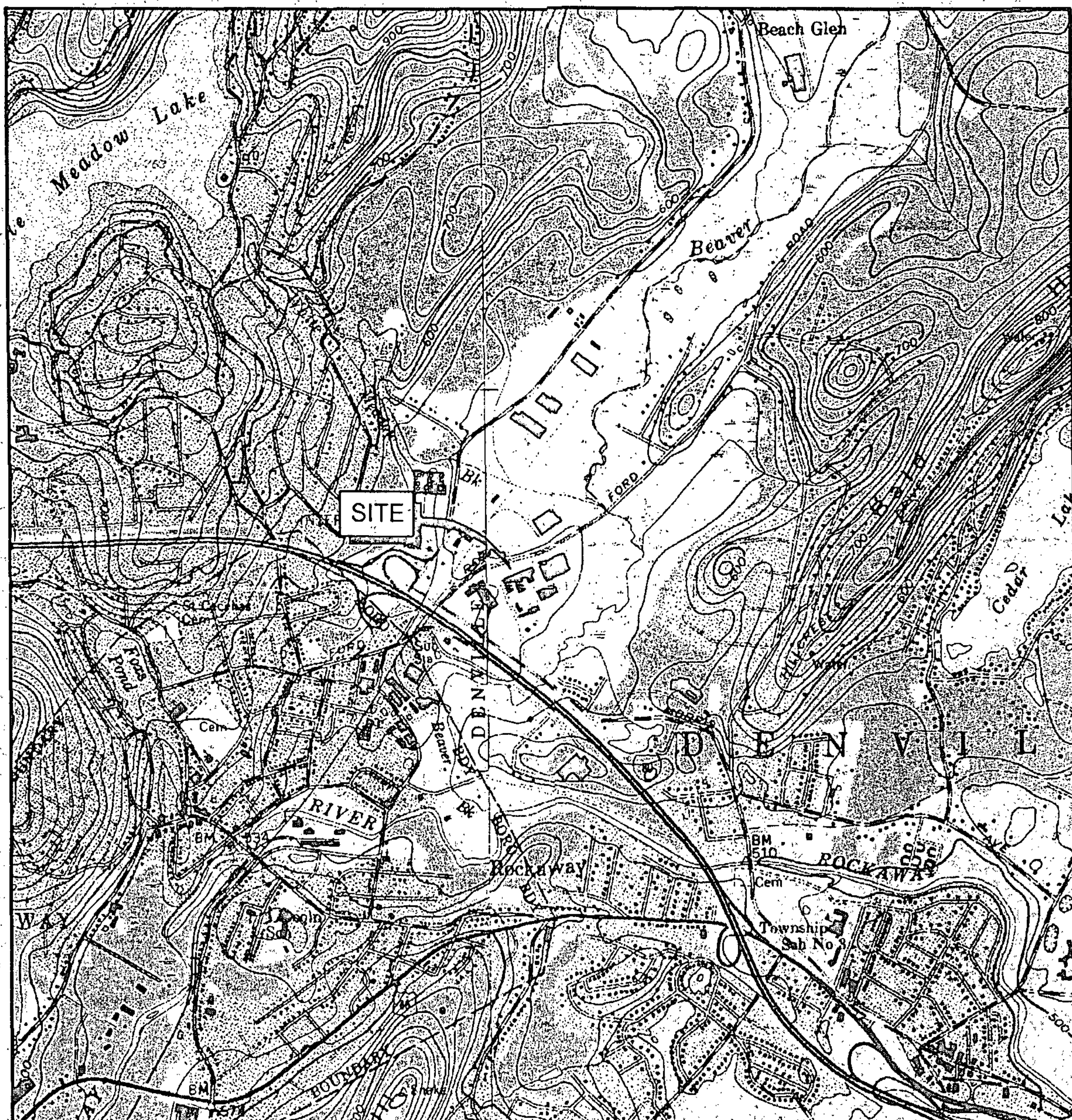
Table 4 - Issues, Recommendations and Follow-up Actions

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
1,4-dioxane is a highly soluble compound that is not able to be treated by air stripping. It is often used as a stabilizer for TCA, which is present in groundwater at the Site.	Groundwater samples should be collected for 1,4-dioxane from the Site, as well as the public supply well.	PRP	NJDEP	2011	1	1
As noted in the 1999 RI/FS report, a sand filter bed that received acid chromate metal plating wastewater was located south of Building 2. Little sampling was performed for chromium during the RI, and currently, only VOC data are collected.	Groundwater samples should be collected for hexavalent chromium downgradient of Building 2.	PRP	NJDEP	2011	1	1

1 Unknown at this time

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
Eastern plume groundwater extraction system is not effectively capturing the contaminated plume.	A monitoring well cluster should be installed in a location between EW-1 and 701 Ford Road.	PRP	NJDEP	2011	N	N
Indoor air concentrations in Building 1 require remediation.	Install sub-slab depressurization system.	PRP	NJDEP	Ongoing	Y	N
Sources of groundwater contamination may be present in Buildings 1 and 2 that are not being captured by the SVE system.	Conduct source investigation in Buildings 1 and 2 at Denville Technical Park.	PRP	NJDEP	2011	Y	N
Potential soil vapor intrusion for buildings that lie over groundwater plumes.	Expand vapor intrusion investigation to Buildings 3, 5, and 6, and 701 Ford Road.	PRP	NJDEP	2011	Y	N

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
An ESD is required to document deviations from the ROD.	Issue ESD to document institutional controls required for the remedy, (e.g., deed notice).	EPA	NJDEP	2012	Y	N
Soil from the ground surface to a depth of two feet was not sampled and, as a result, potential risks or hazards associated with that two-foot soil interval were not assessed.	A deed notice should be placed on the Site to indicate the potential presence of contaminants and the need for precautionary measures should intrusive activities need to be performed.	PRP	NJDEP	2012	Y	N



SOURCE: USGS 7.5 MINUTE QUADS
DOVER & BOONTON, N. J.

0 1000 2000ft

figure 1

SITE LOCATION MAP
DENVILLE TECHNICAL PARK
Denville, New Jersey

54585-00(003)GN-WA001 AUG 24/2009

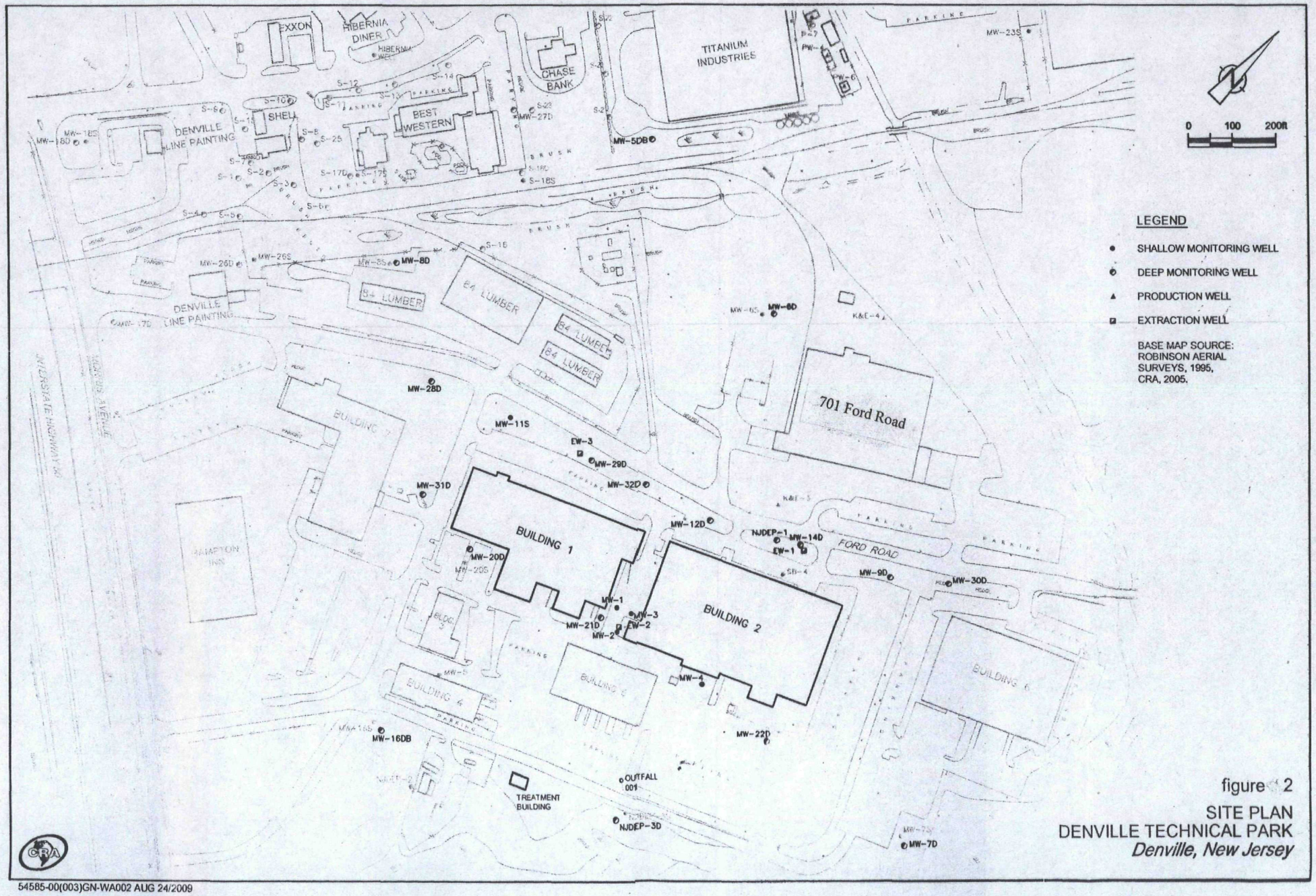
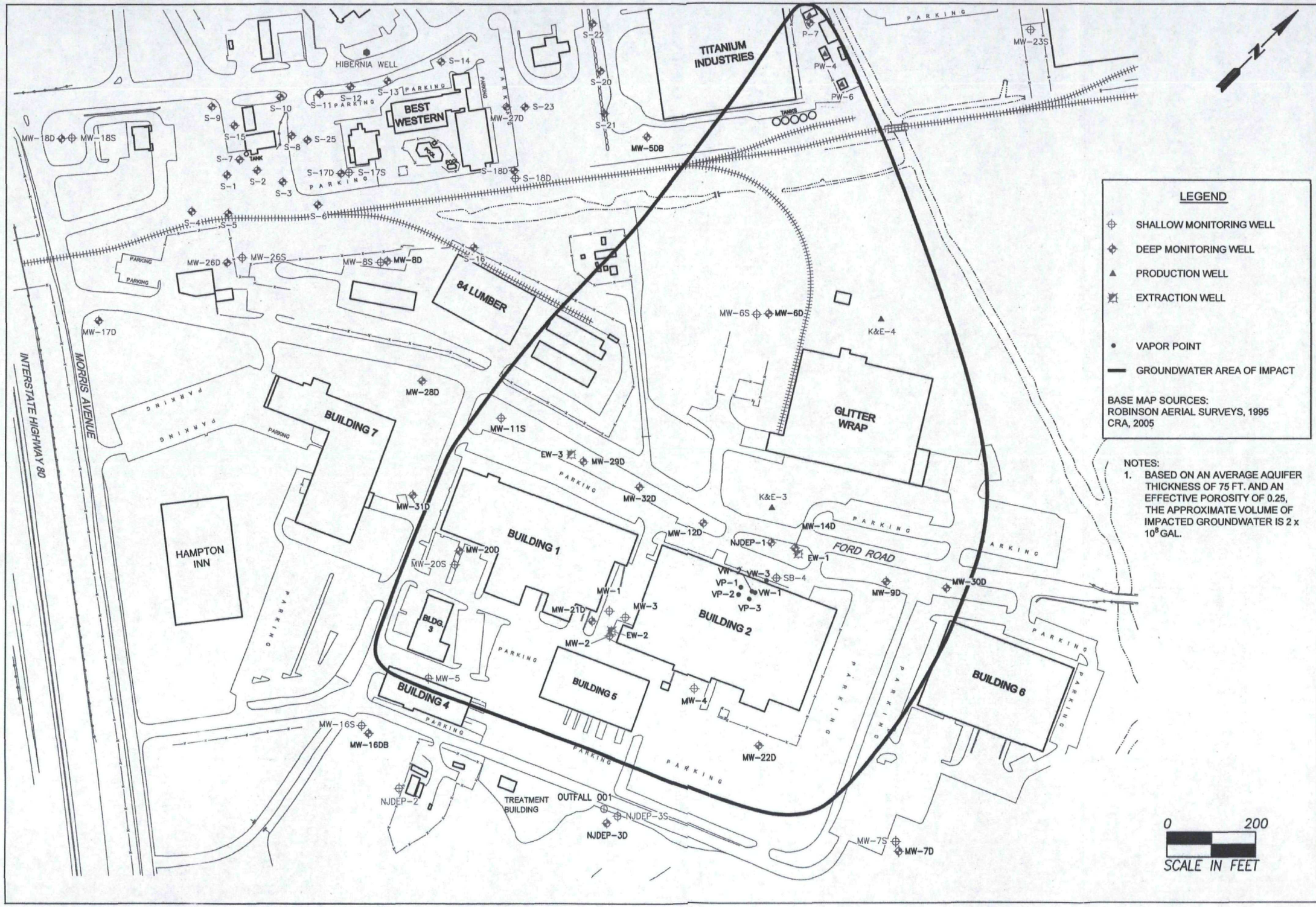


figure 2

SITE PLAN
DENVILLE TECHNICAL PARK
Denville, New Jersey

54585-00(003)GN-WA002 AUG 24/2009



LEGEND

- SHALLOW MONITORING WELL
- DEEP MONITORING WELL
- PRODUCTION WELL
- EXTRACTION WELL
- VAPOR POINT
- GROUNDWATER AREA OF IMPACT

BASE MAP SOURCES:
ROBINSON AERIAL SURVEYS, 1995
CRA, 2005

NOTES:
1. BASED ON AN AVERAGE AQUIFER THICKNESS OF 75 FT. AND AN EFFECTIVE POROSITY OF 0.25, THE APPROXIMATE VOLUME OF IMPACTED GROUNDWATER IS 2 x 10^8 GAL.

DENVILLE TECHNICAL PARK

DENVILLE, NEW JERSEY

GROUND-WATER REMEDY

FILE: 3ATDT02B.dwg | DATE: JANUARY 2009 | FIGURE: 3

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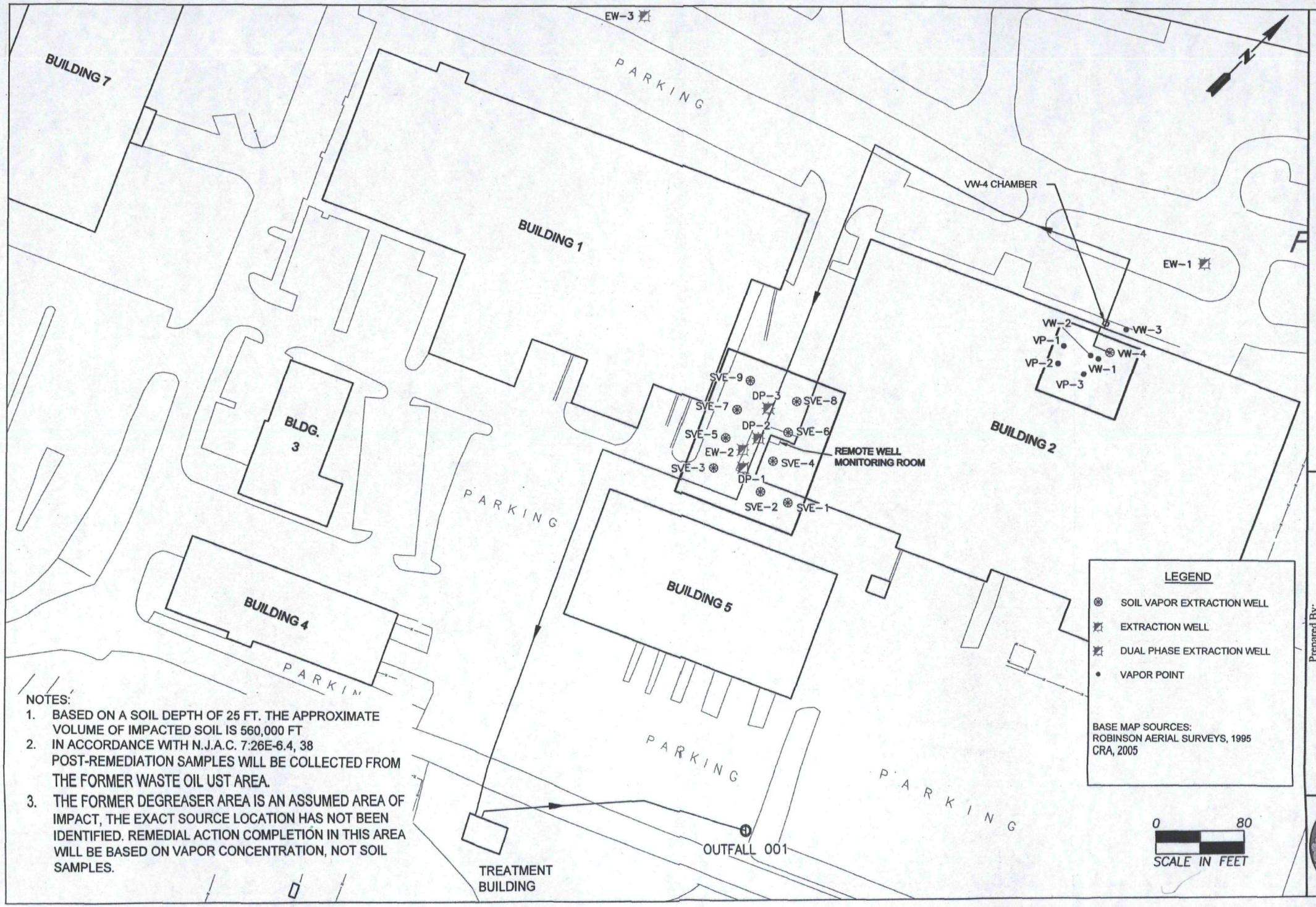

NOTES:

1. BASED ON A SOIL DEPTH OF 25 FT. THE APPROXIMATE VOLUME OF IMPACTED SOIL IS 560,000 FT
2. IN ACCORDANCE WITH N.J.A.C. 7:26E-6.4, 38 POST-REMEDIATION SAMPLES WILL BE COLLECTED FROM THE FORMER WASTE OIL UST AREA.
3. THE FORMER DEGREASER AREA IS AN ASSUMED AREA OF IMPACT, THE EXACT SOURCE LOCATION HAS NOT BEEN IDENTIFIED. REMEDIAL ACTION COMPLETION IN THIS AREA WILL BE BASED ON VAPOR CONCENTRATION, NOT SOIL SAMPLES.

DENVILLE TECHNICAL PARK

DENVILLE, NEW JERSEY

SOIL REMEDIATION

FILE: 3ATDT01B.dwg | DATE: JANUARY 2009 | FIGURE: 4

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DENVILLE TECHNICAL PARK

DENVILLE, NEW JERSEY

TCE CONCENTRATIONS IN GROUND-WATER
NOVEMBER, 2009

FILE: 3ATDT02L.DWG | DATE: January 2010 | FIGURE: 5

LEGEND

- SHALLOW MONITORING WELL
- DEEP MONITORING WELL
- PRODUCTION WELL
- EXTRACTION WELL
- VAPOR POINT
- 12.9 TCE CONCENTRATION (ug/L) NOVEMBER, 2009
- TCE CONCENTRATION CONTOUR, DASHED WHERE INFERRED
- J ESTIMATED VALUE

BASE MAP SOURCES:
ROBINSON AERIAL SURVEYS, 1995
CRA, 2005

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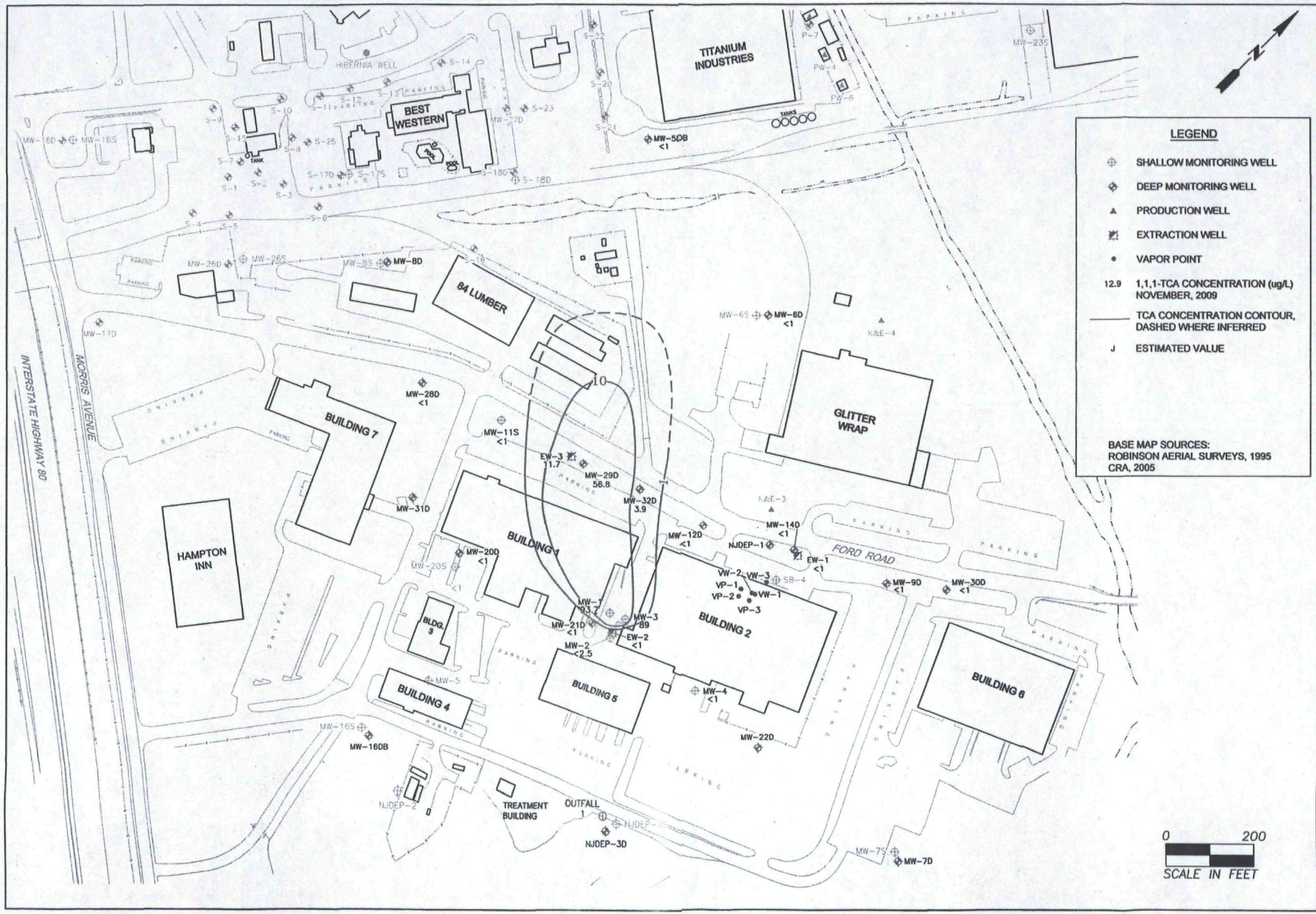
0 200
SCALE IN FEET



LEGEND

- SHALLOW MONITORING WELL
- DEEP MONITORING WELL
- PRODUCTION WELL
- EXTRACTION WELL
- VAPOR POINT
- 12.9 1,1,1-TCA CONCENTRATION (ug/L) NOVEMBER, 2009
- TCA CONCENTRATION CONTOUR, DASHED WHERE INFERRED
- J ESTIMATED VALUE

BASE MAP SOURCES:
ROBINSON AERIAL SURVEYS, 1995
CRA, 2005

DENVILLE TECHNICAL PARK

DENVILLE, NEW JERSEY

1,1,1-TCA CONCENTRATIONS IN GROUND-WATER
NOVEMBER, 2009

FILE: 3ATDT02K.DWG | DATE: January 2010 | FIGURE: 6

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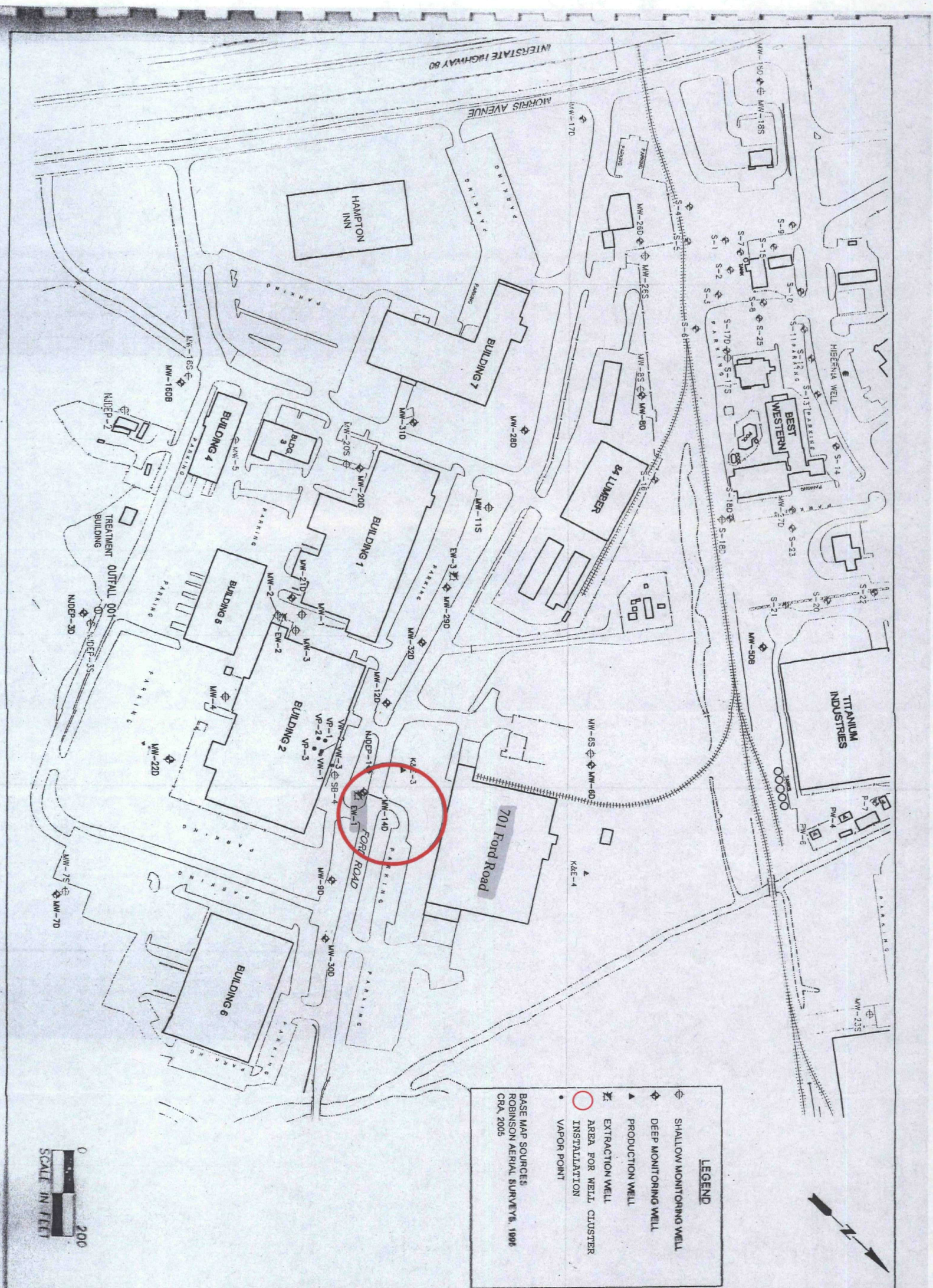

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DENVILLE TECHNICAL PARK

DENVILLE, NEW JERSEY

Area for Well Cluster Installation

FILE:	3ATDT02B.dwg	DATE:	JANUARY 2009	FIGURE:	7